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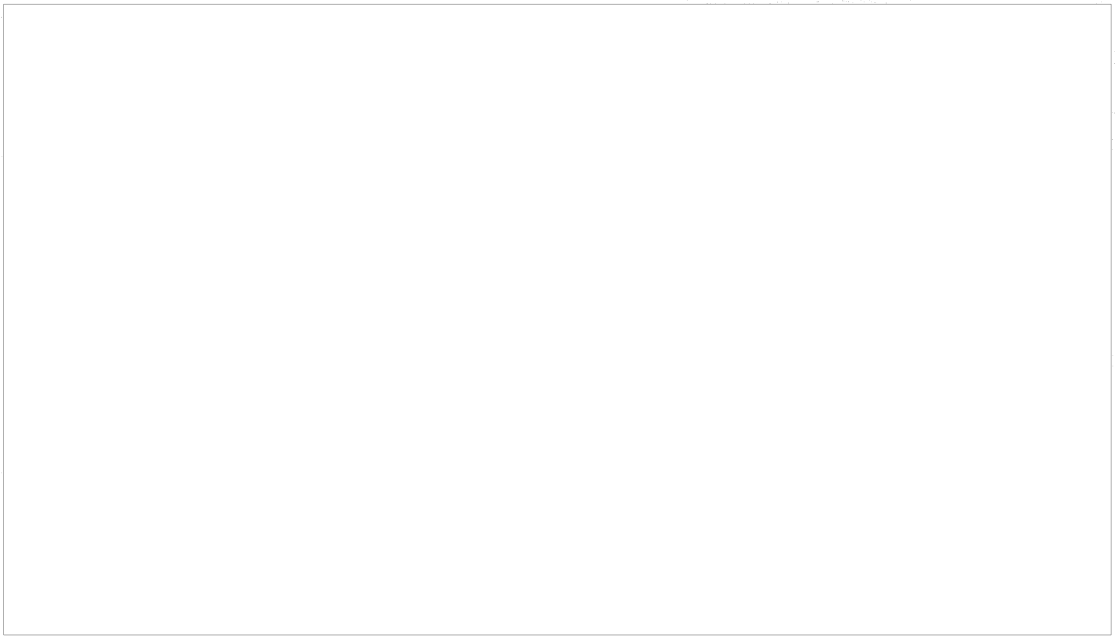

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Title: STATE SCIENTIFIC RESEARCH CHEMICAL INSTITUTE OF HIGH PRESSURES (GIVD) (USSR)

Source: Nauchno-Issledovatel'skiye Instituty Tyazheloy Promyshlennost' pp 95-104

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STATE SCIENTIFIC RESEARCH CHEMICAL INSTITUTE OF HIGH PRESSURES (GIVD)

Located at: Leningrad, Prospekt K. Liebknekhta, 1a

Telephone: 153-61

GIVD is subordinate to the Sector of Scientific and Technical Propaganda, People's Commissariat for Heavy Industries.

Acting Director: A. S. Vasser

Deputy Director for Scientific Matters: N. N. Voroshtsov, Jr.

GIVD conducts research in the field of catalytic processes occurring under conditions of high pressures (synthetis of ammonia, methanol, processing of petroleum, hydrogenation of tars and oils, synthesis of alcohols, esters and carbamide). GIVD also constructs equipment for high pressure research (compressors, circulating pumps, pumps for liquids, autoclaves and various contact apparatus).

SCIENTIFIC SECTORS:

Hydrogenation

Gas Reactions

Technical Catalysis

Physio-Chemical

Aniline Dye

LEADING SCIENTIFIC PERSONNEL:

Academician N. N. Semenov - chemical physics - chain reactions

Prof A. A. Vansheydt - organic chemistry

P. N. Dolgov - organic synthesis

V. V. Ipat'yev - physical chemistry at high pressures and corrosion

D. L. Moldavskiy - organic catalysis, non-ferrous metals

Docent M. S. Nemtsov - catalysis, pyrogenetic processes

P. V. Usachev - nitrogen in compounds, inorganic production

A. V. Frost - chemical physics

V. V. Shishkin - electrochemistry

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EXPERIMENTAL INSTALLATIONS OF GIVD:

Installation for the Oxidation of Phosphorus by Water under Pressure (Large Laboratory Installation). Located in Leningrad, Prospekt K. Libknekht, 1a and is supervised by V. L. Volkov.

The installation has the task of conducting research and actually producing phosphoric acid by means of oxidation of phosphorus by water under pressure. The capacity of this installation is 15 kilograms of phosphorus per hour. The approximate value of the installation is 120,000 rubles.

Installation for the Production of Phenol from Chlorobenzene (Large laboratory installation). Located in Leningrad, Prospekt K. Libknekht, 1a, and is supervised by A. Ye. Oshuyev. The approximate value of the installation is 50,000 rubles.

Installation for the Synthesis of Carbamide from Ammonia and Carbon Dioxide (large laboratory installation). Located in Leningrad, Prospekt K. Libknekht, 1a, and is supervised by N. A. Polotov.

The installation has the duty of obtaining carbamide from ammonia and waste carbon dioxide (obtained in the process of synthesizing ammonia) for the purpose of utilizing the carbamide as fertilizer in agriculture or as raw material in the plastics industry. The approximate value of the installation is 80,000 rubles.

Installation for the Synthesis of the Higher Alcohols (laboratory equipment). located at Leningrad, Prospekt K. Libknekht, 1a, and is supervised by Ye. M. Pocharova.

The Installation has the duty of manufacturing solvents for use in the lacquer and paint industry out of inexpensive and readily available raw materials. The approximate cost of the installation is 43,000 rubles.

Installation for the Hydration of Ethylene (laboratory equipment). Located at Leningrad, Prospekt K. Libknekht, 1a, and is supervised by A. M. Kogenova.

The installation has the Mission of Obtaining ethyl alcohol from waste industrial gases (instead of wastes from the food industry). The approximate cost of the installation is 29,000 rubles.

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Installation for the Synthesis of methanol (laboratory equipment). Located at Leningrad, "Salolin" Plant, Settlement of Volkovo, Novo-Nikolayevskaya Ul., 56, and is supervised by A. Z. Karpov.

The installation has the mission of finding low temperature and sulfur resistant catalysts for the synthesis of methanol. The approximate ~~cost~~ value of the installation is 37,000 rubles.

Hydrogenation Installation (laboratory equipment). This installation consists of two units, located at Leningrad, Prospekt K. Libknekht, 1a, and are supervised by V. N. Pokorskiy and T. S. Piner.

These units have the mission of hydrogenating petroleum products and tars for the purpose of obtaining high quality liquid fuel, as well as increasing the stability of and purification of petroleum products obtained by direct distillation and cracking. The approximate ~~cost~~ value of the installation is 109,000 rubles.

Installation for Studying the Poisoning and Testing of Catalysts Manufactured from Soviet Raw Materials and utilized in the Synthesis of Ammonia (laboratory equipment). The installation consists of two units located at Leningrad, Prospekt K. Libknekht, 1a, and supervised by I. V. Vasenev and V. G. Telegin.

These units have the mission of developing new active and stable catalysts for the synthesis of ammonia from Soviet raw materials. The approximate ~~cost~~ value of the installation is 77,000 rubles.

Installation for the Electrolysis of Water under Pressure (large laboratory equipment). The installation is located at Leningrad, Prospekt K. Libknekht, 1a, and is supervised by V. V. Shishkin.

The installation has the mission of obtaining hydrogen and oxygen in the compressed state. The approximate ~~cost~~ value of the installation is 20,000 rubles.

Installation for the Study of Corrosion of Chemical Apparatus at High Pressures (laboratory equipment). Located at Leningrad, Prospekt, K. Libknekht, 1a, and is supervised by P. S. Perminov.

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The Installation has the mission of selecting and testing the anti-corrosion characteristics of various special materials, such as steel, which are suited for use in apparatus intended for high pressure research.

Over-all number of personnel 336

Scientific associates 105

Annual budget [1957] 1,730,000 rubles.

BASIC PROBLEMS CURRENTLY UNDERTAKEN AT GIVD:

In the Hydrogenation Sector:

a) Stabilization of gasoline. Supervised by B. L. Moldavskiy and V. N. Pokrovskiy.

b) Production of gasoline from non-commercial types of fuels. Supervised by M. S. Nemtsov and I. S. Diner.

c) Production and purification of lubricating oils. Supervised by I. I. Lobus.

d) Manufacture toluene, ethylbenzene, and tetraline from naphthalene. Supervised by M. S. Nemtsev and F. S. Shcuenderovich.

e) Desulfunization of petroleum and slate distillates. Supervised by B. L. Moldavskiy and V. N. Pokorskiy.

Research in the field of the theory of reactions of hydrocarbons. Supervised by A. V. Frost and A. I. Dintsev.

Manufacture of carbamide from carbon dioxide and ammonia. Supervised by B. N. Dolgov and B. A. Dolotov.

Synthesis of alcohols from carbon monoxide and hydrogen. Supervised by B. N. Dolgov and Ye. M. Docharova.

Manufacture of ethyl alcohol by direct hydration of ethylene. Supervised by A. A. Vansheydt and A. M. Koganov.

Synthesis of esters. Supervised by B. N. Dolgov.

Manufacture of phosphoric acid by the oxidation of phosphorus with water. Supervised by V. L. Volkov.

Manufacture of oxygen and hydrogen by the electrolysis of water under pressure. Supervised by V. V. Shishkin.

Research on Corrosion of high pressure chemical equipment as well as corrosion in boilers. Supervised by V. V. Ipat'yev, Ye. I. Nikiforov and P. S. Perminov.

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Research on the Study and preparation of new catalysts for the manufacture of ammonia. Supervised by P. V. Usachev, V. G. Telegin and B. S. Lachinov.

Physico-chemical studies of the properties of matter under pressure. Supervised by V. V. Ipat'yev, V. P. Teodorovich and N. V. Lysakov.

ENTERPRISES REGULARLY SERVED BY GIVD:

Stalinogorsk Chemical Combine (Stalinogorsk)

Chernorechensk Chemical Combine (Dzerzhinsk)

Gorlovka Chemical Combine (Gorlovka)

Gortekhproyekt (Moscow)

AviaTop (Moscow)

AnilTrest (Moscow)

"Koks" Trust (Khar'kov)

SoyuzAzot

Various laboratories of plants and institutes, carrying out research in the field of high pressures.

TECHNICAL AID IS RENDERED BY GIVD TO INDUSTRIES ON THE FOLLOWING MATTERS:

Synthesis of methanol and other alcohols (catalysis). Silicon-organic compounds.

Physico-chemical processes at high pressures (elasticity of steam, coefficient of expansion, viscosity, equilibrium of reactions, etc.).

Utilization of chlorine substituted industrial hydrocarbons for the synthesis of intermediate products (phenol, aniline, paranitroaniline). Construction of a continuously acting apparatus for manufacturing the above mentioned items.

Construction of high pressure apparatus (autoclaves, compressors, valves, connections, presses, circulation pumps and heating apparatus for high pressure research).

Synthesis of ammonia. Explaining the activity of catalysts and the poisoning of catalysts. Processes of synthesis.

Hydrogen induced corrosion.

Corrosion in high pressure steam boilers.

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Theory of catalysis in the field of destructive hydrogenation.

Hydrogenation of liquid fuel and cracking products (mazut, tars, etc).

Solubility and diffusion of gases in liquids under pressure.

Metallo-organic compounds. Wet method for processing arsenic ores.

PERIODICAL PUBLICATIONS OF GIVD:

"Byulleten' GIVD", gives information on scientific research work being conducted and completed at GIVD. Carries information on the construction and design of high pressure apparatus and explains the technical and managerial functions of GIVD. The periodical was first published in 1933, and appeared 6 times a year. Its size is 15 printed sheets (approximately 120 pages) per year. In 1934 there was 200 copies circulated, including copies which were sent to other establishments conducting research in similar fields. The responsible editor for the publication is A. S. Vesser.

FOREIGN ORGANIZATIONS WITH WHICH GIVD MAINTAINS LIAISON [redacted]:

Dr. Richard Iwonka, Chemistry Institute, Berlin University, Berlin

Prof-Dr. H. Kautsky, Chemistry Institute, Heidelberg University, Heidelberg

Prof Dr. E. Müller, Institute for Electro-chemistry and Physical Chemistry, Technological Institute, Dresden.

Dr. Steacie, Physical Chemistry Institute, Frankfurt am Main

Dr. I. C. Grosh, University of Calcutta, Calcutta

P. H. Groggins, Bureau of Chemistry and Soils, Washington, D.C.

/May be Phillip H. Groggins, 1709 Surrey Lane, N.W., Washington DC; Telephone Ordway 4796/7

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GIVD was organized in 1929 on the basis of the Laboratory of High Pressures, State Institute of Applied Chemistry. The first research problems undertaken by the new Institute were based on high pressure studies initiated by V. N. Ipat'yev. Among the main studies which were conducted were: a) oxidation of phosphorus by water under pressure, b) manufacture of synthetic liquid fuel by hydrogenation, c) synthesis of methanol from water gas.

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These three main research subjects are still being pursued at the Institute, but the methods employed in the studies have improved with technological advances. In addition the Institute has initiated a series of studies on the corrosion of metals, particularly metals used in the building of equipment used in high pressure research.

Another important project undertaken by the Institute has been the production of liquid fuels by hydrogenation. As a matter of fact at a special conference on hydrogenation, convened in 1932, it appeared that GIVD was the only Institute carrying out research in this field at that time.

In the field of gas reactions, the Institute made an important contribution to Soviet technological advance by developing and perfecting a method for synthesizing methanol from water gas. As a culmination to the research, the Institute has installed at the "Salolin" Plant special pilot plant equipment with a capacity of 100 liters of methyl alcohol per day. The Institute also developed a new type of catalyst for use in the synthesis of methanol. It proved so satisfactory that the Stalinogorsk Methanol Plant was converted to using the GIVD developed catalyst.

Other important work completed and carried out by the Institute included methods for the manufacture of the higher alcohols out of industrial water gas, the syntnesis of carbamide from ammonia and liquid carbonic acid, and the manufacture of ethyl alcohol by hydrating ethylene under pressure. Some significant success has also been achieved in the manufacture of intermediate products for use in the synthesis of dyestuffs and the synthesis of phenol.

However overshadowing all of the above mentioned investigations has been the work conducted by the Institute on particular problems arising out of its specific field of research. Working with high pressures and temperatures, as they do, it has been necessary to maintain a close check on the process of corrosion of equipment, which is intensified due to the high pressures and temperatures. Thus the Institute has always devoted much of its research energies toward the development of new corrosion resistant alloys as well as methods for impeding corrosion in existing equipment.

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In addition to a large amount of practical research, the Institute has carried out some important theoretical research. Among such research projects are studies of the speed of chemical reaction, theory of catalytic action, chemical equilibrium, elasticity of steam and the solubility of gases in liquids under pressure, diffusion of gases, and roentgenography.

In general it can be said that the research results of the Institute are rapidly accepted by industry. This can be seen more readily by the following list of equipment and items manufactured by industry upon recommendation and research by GIVD:

1) reaction bombs and an autoclaves with a 5 liter capacity operating at pressures up to 200 atmospheres and at temperature ranges of 200 to 650°C,
2) valves which can be regulated precisely for pressures up to 1000 atmospheres, as well as all connections and fittings for high pressure conduits,
3) two stage compressors operating at pressures of 150 atmospheres and a capacity of 0.25 cubic meters per hour,
4) compressors [redacted] operating at 1000 atmospheres with a capacity of 10 cubic meters per hour,
5) pumps for handling liquids at pressures of 500 atmospheres with various capacities,
6) laboratory ammonia columns,
7) Rotar type apparatus for the synthesis of methanol on laboratory scale,
8) circulation pumps operating at pressures of 150 to 200 atmospheres and a capacity of 24 liters per hour,
9) Langmuir type metallic mercury pumps for producing high vacuum.

In addition the Institute is working on a new circulation pump capable of operating at 500 atmospheres with a capacity of 0.5 cubic meters per hour. GIVD, at the present time [1935], is the sole source of high pressure equipment for other laboratories and institutes. Sales of such equipment and apparatus amounted to 450,000 rubles during 1933.

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